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Nanoemulsions derived from lanolin show promising drug delivery properties

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We have been able to demonstrate that various lanolin fractions and/or ethoxylated derivatives of lanolin can form stable nanoemulsions when subjected to high rates of shear. These particles (Westbrook Lanosomes™) exhibit very low intrinsic viscosities at solids contents of up to 30% w/w. They may, therefore, be suitable for use as lotions or in spray formulations for applications where the high emolliency and moisturising properties of lanolin and its derivatives are known to be of benefit, e.g. to dry or damaged areas of skin. Typical particle size distributions in the range of 50nm to 150nm have been produced using a variety of emulsifying equipment and a range of lanolin derived materials. It has also proved possible to form nanoemulsions containing lanolin derivatives and a wide variety of other lipid materials. Preliminary investigations have also shown that a number of these novel compositions exhibit good particle size and emulsion stability when they are subjected to either autoclave or freeze/thaw cycles. Many of them have also exhibited both particle size and emulsion stability on storage at 40^0 for time periods of up to 2 years. There are a number of references in the scientific literature to the abilities of lanolin-containing creams and topical compositions to participate in the transdermal delivery (TDD) of a number of pharmaceutically active ingredients. Accordingly, we have now begun a programme of work to examine the TDD properties of different lanosome compositions.

Materials and Methods:

The following compounds were individually incorporated into lanosomes (composed of 5 parts Laneth 20 / 25 parts Lanolin / 70 parts water) using conventional mixing techniques and at the notional drug concentrations described:

Testosterone : Ibuprofen	50mg/ml
5-Fluorouracil	25mg/ml
Verapamil	5mg/ml
Metronidazole : Vincristine : Fentanyl Citrate	10mg/ml

The delivery of each active ingredient across isolated heat stripped human stratum corneum was determined over a 24 hour period using a modified Franz cell technique. Receptor fluid was phosphate buffered saline (0.1M pH 7.4) containing 10% ethanol. Compounds were determined in the receptor fluid by specific HPLC techniques. Samples (250µl) of receptor fluid were withdrawn at 1, 2, 3, 4, 6 and (18) or 24 hours after starting the experiment.

Table 1. Results

Drug	flux (mcg/cm^2/ hr) lanosomes	commercial cream/gel
Testosterone	0.44	-
Ibuprofen	20.8	45.7
5-Fluorouracil	3.4	4.5 - 5.0
Verapamil Hydrochloride	1.8	-
Metronidazole	1.2	10.4
Vincristine Sulphate	1.5	-
Fentanyl Citrate	0.4	-

Results and Discussion:

Using a nanoemulsion composed of lanolin (Medilan™), the 20 mole polyethylene glycol ether of lanolin alcohols (Laneth 20, Aqualose W20™) and water, it has been possible to demonstrate the TDD of a number of pharmaceutically active ingredients across isolated human stratum corneum. The modest levels of this activity obtained with these simple formulations, indicate that nanoemulsions derived from lanolin and its derivatives are capable of being developed into useful drug delivery vehicles. Studies are underway on the influence of both the composition of the lanosomes and of known penetration enhancers incorporated into these nanoemulsions on the transdermal flux of a number of drug substances.

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